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Rydberg tagging time-of-flight imaging to study ultracold collisions[1] JONATHAN TALLANT, K. RICHARD OVERSTREET, ARNE SCHWETTMANN, JAMES P. SHAFFER, University of Oklahoma — We have further developed Rydberg tagging time-of-flight and imaging techniques so that they can effectively be used to study ultracold collisions. We have realized a velocity resolution of ~ 2.5 cm/s with our apparatus. This resolution enables Rydberg tagging time-of-flight and imaging spectroscopy to determine the exit channel of an ultracold collision. Results and prospects for applying these methods to measure differential cross-sections for Rydberg atom collisions, photoassociative collisions, and three-body recombination will be presented.

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